COVID-19 Pandemic and Mental Health: Prevalence and Correlates of New-Onset Obsessive-Compulsive Symptoms in a Canadian Province

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Table of Contents

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Abstract

Background: The World Health Organization (WHO) declared a global coronavirus disease (COVID-19) pandemic on March 11, 2020. Subsequently, an intensive public health campaign recommending regular hand washing, physical distancing, and facemask use evolved as a global strategy to limit viral transmission.

Objective: This study investigates the prevalence of Obsessive-Compulsive Disorder (OCD) symptoms at an early stage of the COVID-19 pandemic in Canada.

Methods: This a population-based, cross-sectional online survey of Canadians aged 18 years and older. We used the contamination and cleanliness subscale of the Brief Obsessive-Compulsive Scale (BOCS), Perceived Stress Scale (PSS), likely Generalized Anxiety Disorder (GAD) with the Generalized Anxiety Disorder 7-item (GAD-7) scale, and likely Major Depressive Disorder (MDD) with the Patient Health Questionnaire-9 (PHQ-9) scale to investigate prevalence of OCD symptoms and their correlation to perceived stress, anxiety, and depression during the COVID-19 pandemic.

Results: 32,805 individuals who subscribed for supportive text messages with Text4Hope were invited to complete an online survey; 6,041 responded with a mean age of 41.95 years (age range 11-88 years) and a response rate of 18.4%. About 53.8-60.3% of the participants reported onset of OCD symptoms during the COVID-19 pandemic. Respondents who were worried about dirt, germs, and viruses only since the start of the COVID-19 pandemic were significantly more likely to have moderate/high stress ($z=6.4$, $p<0.001$), likely GAD ($z= 6.0$ $p<0.001$), and likely MDD ($z=2.7$, $p<0.01$) compared to respondents who have never been worried about dirt, germs, and viruses. Similarly, respondents who engage in compulsive hand washing were significantly more likely to have moderate/high stress ($z=4.6$, $p<0.001$) and likely GAD ($z= 4.6$ $p<0.001$) but not likely MDD ($z=1.4$, $p=0.16$) compared to respondents who have never engaged in compulsive hand washing.

Conclusions: Prevalence of OCD symptoms increased during the early phase of the COVID-19 pandemic, at a rate significantly higher than pre-pandemic rates reported for the general population. Presenting with OCD symptoms during the pandemic significantly increases the likelihood for respondents to present with elevated stress levels, likely GAD and likely MDD. Clinical Trial: N/A

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Keywords: OCD, Text4Hope survey, COVID-19, Pandemic, Stress, Depression, Anxiety

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Conclusion: Prevalence of OCD symptoms increased during the early phase of the COVID-19

pandemic, at a rate significantly higher than pre-pandemic rates reported for the general population. Presenting with OCD symptoms during the pandemic significantly increases the likelihood for respondents to present with elevated stress levels, likely GAD and likely MDD.

Key words: COVID-19, Obsessive Compulsive Disorder, stress, anxiety, major depressive disorder, public health, text, technology, pandemic

Introduction

The 2019 coronavirus disease (COVID-19) can cause a form of severe acute respiratory syndrome that may rapidly lead to death in vulnerable persons. It has a high droplet transmission from person to person with a fatality rate of 2-5%.[1,2] In March of 2020, approximately 136 countries imposed stringent measures to limit the spread of COVID-19, including staying at home, physical distancing of 2 meters, and prohibition of social gatherings. This has been accompanied by extensive public health campaigns on regular hand washing, hygiene, and personal protective equipment (PPE) such as face masks and gloves.

While these measures are important, they may negatively impact the mental health of vulnerable individuals. Limitations and restrictions imposed on individuals aimed towards the protection of the public from communicable diseases can result in mental illness.[3] In this context, public perception is positively correlated with psychological impact of an outbreak[4]. An important risk factor for mental illness during a pandemic is an individual's constant worry about self and family members. [4] Excessive worry is an accepted etiologic factor for development of obsessive-compulsive disorder (OCD) symptoms.[5]

OCD is characterized by obsessions that include fear of contamination by dirt or germs, resulting in distress that frequently results in compulsions to temporarily alleviate anxiety. While the lifetime prevalence of OCD symptoms is over 25%,[6] the lifetime prevalence for the full disorder is much less, estimated at 2-3% for the general population. [7] OCD is highly comorbid with anxiety disorders and depression,[8] including major depressive disorder (MDD), social anxiety disorder, and generalized anxiety disorder (GAD).[9] Individuals with OCD may experience a significant impairment in psychosocial and occupational level of functioning leading to, or exacerbating, poor quality of life. [10]

In the absence of early intervention, OCD can run a chronic course.[11] Diminished quality of life seen in people diagnosed with OCD is comparable to the level observed with other severe mental disorders like schizophrenia. [12] The etiology of OCD is associated with the interplay of multiple risk factors, such as gene, environment, and life stressors. [13]

There is a paucity of data describing the prevalence of OCD symptoms during communicable disease pandemics, despite the fact that these represent a period of time when people are required to be hypervigilant about preventing the threat of contamination of self and others. Our study aimed to increase our knowledge in this area by investigating associations between OCD symptoms and symptoms of GAD, MDD, and perceived stress using a population-based, cross-sectional survey design during the COVID-19 pandemic. Stressful life events may precipitate or predispose individuals to development of OCD symptoms. The intense focus on danger of contamination from a virus during COVID-19, with the ensuing major disruption of personal health, social routines, health-systems, and the economy, may increase the risks associated with the genesis of OCD symptoms in the population [14].

Data collection for this study occurred during the initial phase of the COVID-19 epidemic in the province of Alberta, Canada, currently comprising a census population of 4,413,146 persons.[15] At the close of the survey collection on March 30th, 2020, 690 COVID-19 cases were identified in the province, of which 65 were suspected to be community acquired, 94 were recovered, and 47 had been hospitalized, with a total of 17 admissions to intensive care units [16].

Methods

This is a cross-sectional study based on data collected online from subscribers to Text4Hope, a daily supportive text message service launched in partnership with Alberta Health Services to support the

mental health of Alberta residents. Individuals self-subscribed to Text4Hope by texting "COVID19HOPE" to a designated short code number. Subscribers receive a link to the online survey designed to gather demographic variables such as age, gender, ethnicity, education, employment status, relationship status, and housing status. The 10 minute (average duration) survey also assessed obsessive compulsive symptoms with two items on the Brief Obsessive-Compulsive Scale (BOCS)[17], perceived stress with the Perceived Stress Scale (PSS)[18], likely Generalized Anxiety Disorder (GAD) with the Generalized Anxiety Disorder 7-item (GAD-7) scale[19], and likely Major Depressive Disorder (MDD) with the Patient Health Questionnaire-9 (PHQ-9) scale[20]. The two modified questions from the BOCS were:

- I am worried about dirt, germs, and viruses. Ex. Fear of getting germs from touching door handles or shaking hands or sitting in certain chairs or seats or fear of getting COVID-19.
- I wash my hands very often or in a special way to be sure I am not dirty or contaminated. Ex. Washing one's hands many times a day or for long periods after touching, or thinking one has touched, a contaminated object.

The responses to the above questions were modified to these three Likert scales: "Only during COVID-19 Pandemic", "Before and During COVID-19 Pandemic" or "Never".

The study was approved by the University of Alberta Human Ethics Review Board (Pro00086163) and consent was implied if the participants completed the online survey and submitted responses. With an estimated population of 4,371,316 in Alberta, we calculated the minimum sample size required to estimate mental disorder prevalence rates with a confidence level of 99% and a 2% margin of error as n=4,200. Given the expected response rate of 20%,[21] we planned to extract data after at least 20,785 individuals had subscribed to Text4Hope. Data were collected March 23-30, 2020 with 32,805 subscriptions to Text4Hope, thus exceeding the target sample size. The data were analysed with Statistical Package for Social Sciences (SPSS) version 20[22] using descriptive statistics

and Chi Square tests. Two tailed significance ($p < 0.05$) was used to assess the relationship between obsessive compulsive symptoms and other mental health variables. Given the cross-sectional study design, there was no imputation for missing data and the results were based on completed survey responses.

Results

Of the 32,805 individuals invited to complete an online survey, 6,041 responded, yielding a response rate of 18.4%. Table 1 provides descriptive summaries of the demographic and clinical characteristics of the respondents.

Table 1: Demographic and clinical characteristics of respondents

Variables	Overall
Gender	
Male	740 (12.4%)
Female	5185 (86.6%)
Other Gender	61 (1%)
Age (Years)	
≤25	640 (10.9%)
26-40	2174 (37%)
41-60	2539 (43.3%)
>60	517 (8.8%)

Ethnicity	
Caucasian	4910 (82.2%)
Indigenous	205 (3.4%)
Asian	301 (5%)
Other	554 (9.3%)
Education	
Less than High School Diploma	218 (3.6%)
High School Diploma	583 (9.7%)
Post-Secondary Education	5123 (85.6%)
Other Education	59 (1%)
Employment status	
Employed	3726 (72.1%)
Unemployed	719 (13.9%)
Retired	399 (7.7%)
Student	322 (6.2%)
Relationship status	
Married/Common-law/Partnered	4284 (71.6%)
Separated/Divorced	438 (7.3%)
Widowed	93 (1.6%)
Single	1105 (18.5%)
Other	62 (1%)
Housing status	
Own Home	3917 (66.6%)
Living with Family	548 (9.3%)
Renting	1355 (23%)
Other	63 (1.1%)
Worried about dirt, germs, and viruses	
Only since COVID-19 pandemic	3111 (60.3%)
Before and during COVID-19 pandemic	1293 (25.1%)
Never	753 (14.6%)
Wash hands very often or in a special way to be sure he/she is not dirty or contaminated	
Only since COVID-19 pandemic	2771 (53.8%)
Before and during COVID-19 pandemic	1702 (33%)
Never	678 (13.2%)
Respondents had moderate/high stress	4689 (77.6%)
Respondents had likely GAD	2362 (46.7%)
Respondents had likely MDD	2130 (41.3%)

The data displayed in Table 1 indicate that 60.3% of respondents had obsessions related to contamination with dirt, germs, or viruses and 53.8% had compulsions to wash hands repeatedly or in special way which both started during the COVID-19 pandemic. The one-week prevalence rates for moderate/high stress, likely GAD, and likely MDD in Alberta were 84.9%, 46.7%, and 41.4%, respectively.

Table 2: Demographic characteristics of respondents with obsessive symptoms (Dirt, germs, viruses)

	Worried about dirt, germs, and viruses				
Variables	**Only since COVID-19 pandemic "After"**	**Before and during COVID-19 pandemic**	**Never**	**P-value**	**Effect Size (Phi)**
Gender					

Male	388 (63.2%)	106 (17.3%)	120 (19.5%)	0.00	.08
Female	2694 (60.1%)	1168 (26%)	623 (13.9%)		
Other Gender	25 (52.1%)	16 (33.3%)	7 (14.6%)		
Age (Years)					
≤25	308 (55.7%)	166 (30%)	79 (14.3%)	0.00	.06
26-40	1146 (60.8%)	494 (26.2%)	246 (13%)		
41-60	1333 (60.9%)	513 (23.4%)	344 (15.7%)		
>60	281 (62.0%)	96 (21.2%)	76 (16.8%)		
Ethnicity					
Caucasian	2630 (61.2%)	1023 (23.8%)	642 (14.9%)	0.00	.07
Indigenous	101 (56.4%)	57 (31.8%)	21 (11.7%)		
Asian	131 (58.5%)	73 (32.6%)	20 (8.9%)		
Other	241 (54.8%)	131 (29.8%)	68 (15.5%)		
Education					
Less than High School Diploma	93 (52.8%)	53 (30.1%)	30 (17.0%)	0.01	.06
High School Diploma	280 (57.7%)	133 (27.4%)	72 (14.8%)		
Post-Secondary Education	2714 (61.0%)	1085 (24.4%)	647 (14.6%)		
Other Education	19 (45.2%)	19 (45.2%)	4 (9.5%)		
Employment status					
Employed	1994 (62.4%)	739 (23.1%)	460 (14.4%)	0.002	.07
Unemployed	327 (54.0%)	186 (30.7%)	92 (15.2%)		
Retired	225 (63.2%)	75 (21.1%)	56 (15.7%)		
Student	172 (59.9%)	73 25.4(%)	42 (14.6%)		
Relationship status					
Married/Common-law/Partnered	2287 (61.6%)	911 (24.5%)	515 (13.9%)	0.001	.07
Separated/Divorced	243 (62.5%)	87 (22.4%)	59 (15.2%)		
Widowed	56 (66.7%)	18 (21.4%)	10 (11.9%)		
Single	507 (55.0%)	257 (27.9%)	158 (17.1%)		
Other	16 (38.1%)	17 (40.5%)	9 (21.4%)		
Housing status					
Own Home	2087 (61.4%)	807 (23.7%)	505 (14.9%)	0.00	.07
Living with Family	249 (52.1%)	142 (29.7%)	87 (18.2%)		
Renting	722 (60.7%)	320 (26.9%)	148 (12.4%)		
Other	26 (56.5%)	16 (34.8%)	4 (8.7%)		

Table 2 suggests there were statistically significant associations between obsessions related to dirt, germs and viruses, and all demographic variables assessed. Males, respondents who were over 60 years of age, Caucasians, those with post-secondary education, retired, widowed and those living in their own homes had higher proportion of respondents' express worry related to contamination with dirt, germs and viruses compared to other respondents.

Table 3: Demographic characteristics of respondents with compulsive symptoms (Repeated hand washing)

Variables	Wash hands very often or in a special way to be sure he/she is not dirty or contaminated			P-value	Effect Size (Phi)
	Only since COVID-19 pandemic "After"	Before and during COVID-19 pandemic	Never		
Gender					
Male	350 (57.3%)	189 (30.9%)	72 (11.8%)	0.06	.04
Female	2395 (53.4%)	1495 (33.4%)	592 (13.2%)		
Other Gender	22 (45.8%)	14 (29.2%)	12 (25.0%)		
Age (Years)					
≤25	264 (47.7%)	238 (43.0%)	51 (9.2%)	0.00	.11
26-40	989 (52.5%)	658 (34.9%)	237 (12.6%)		
41-60	1198 (54.7%)	656 (30.0%)	335 (15.3%)		
>60	284 (63.3%)	121 (26.9%)	44 (9.8%)		
Ethnicity					
Caucasian	2363 (55.1%)	1348 (31.4%)	577 (13.5%)	0.00	.08
Indigenous	82 (45.8%)	79 (44.1%)	18 (10.1%)		
Asian	119 (53.1%)	83 (37.1%)	22 (9.8%)		
Other	197 (44.7%)	184 (41.7%)	60 (13.6%)		
Education					
Less than High School Diploma	79 (44.6%)	83 (46.9%)	15 (8.5%)	0.00	.09
High School Diploma	251 (51.9%)	196 (40.5%)	37 (7.6%)		
Post-Secondary Education	2417 (54.4%)	1403 (31.6%)	620 (14.0%)		
Other Education	19 (45.2%)	17 (40.5%)	6 (14.3%)		
Employment status					
Employed	1789 (56.1%)	991 (31.1%)	408 (12.8%)	0.00	.09
Unemployed	276 (45.5%)	242 (39.9%)	89 (14.7%)		
Retired	220 (62.1%)	92 (26.0%)	42 (11.9%)		
Student	142 (49.5%)	112 (39.0%)	33 (11.5%)		
Relationship status					
Married/Common-law/Partnered	2030 (54.7%)	1182 (31.9%)	496 (13.4%)	0.09	.05
Separated/Divorced	205 (52.6%)	126 (32.3%)	59 (15.1%)		
Widowed	45 (53.6%)	32 (38.1%)	7 (8.3%)		
Single	468 (50.8%)	342 (37.1%)	111 (12.1%)		
Other	21 (51.2%)	16 (39.0%)	4 (9.8%)		
Housing status					
Own Home	1894 (55.8%)	1022 (30.1%)	477 (14.1%)	0.00	.10
Living with Family	208 (43.5%)	215 (45.0%)	55 (11.5%)		
Renting	626 (52.6%)	430 (36.1%)	134 (11.3%)		
Other	19 (41.3%)	20 (43.5%)	7 (15.2%)		

Table 3 suggests that all demographic variables except gender and relationship status had statistically significant relationships with compulsive hand washing. Males, respondents who were over 60 years

of age, Caucasians, those with post-secondary education, retired, and home owners had higher proportion of respondents who were engaged in compulsive hand washing compared to other respondents.

Table 4: Chi-Square test of association between obsessive compulsive symptoms and perceived stress, likely GAD and likely MDD

	Perceived Stress			Generalized Anxiety Disorder			Major Depressive Disorder		
Variables	**Moderate/High Stress**	**P-value**	**Effect Size (Phi)**	**GAD Likely**	**P-value**	**Effect Size (Phi)**	**MDD Likely**	**P-value**	**Effect Size (Phi)**
Worried about dirt, germs, and viruses									
Only since COVID-19 pandemic	2656 (85.6%)	0.000	0.11	1445 (47.3%)	0.00	0.10	1276 (41.1%)	0.00	0.06
Before and during COVID-19 pandemic	1133 (88.0%)			656 (51.7%)			581 (45.1%)		
Never	571 (76.0%)			258 (35.1%)			268 (35.6%)		
Wash hands very often or in a special way to be sure hands are not dirty or contaminated									
Only since COVID-19 pandemic	2359 (85.3%)	0.000	0.08	1288 (47.3%)	0.00	0.07	1111 (40.1%)	0.01	0.05
Before and during COVID-19 pandemic	1471 (86.8%)			820 (49.2%)			759 (44.8%)		
Never	526 (78.0%)			249 (37.4%)			252 (37.2%)		

The data displayed in Table 4 indicate significant associations between obsessions about dirt, germs, and viruses, and between those who engaged in compulsive hand washing and the likelihood that respondents had moderate/high stress, likely GAD, and likely MDD. Post hoc analysis using adjusted residuals indicates that respondents who were worried about dirt, germs, and viruses only since the start of the COVID-19 pandemic were significantly more likely to have moderate/high stress (z=6.4, p<0.001), likely GAD (z= 6.0 p<0.001), and likely MDD (z=2.7, p<0.01) compared to respondents who have never been worried about dirt, germs, and viruses. Similarly, respondents who engage in compulsive hand washing were significantly more likely to have moderate/high stress (z=4.6, p<0.001) and likely GAD (z= 4.6 p<0.001) but not likely MDD (z=1.4, p=0.16) compared to respondents who have never engaged in compulsive hand washing.

Discussion

To our knowledge, this population-based, cross-sectional survey of 6,501 respondents during the COVID-19 pandemic is the first to report the prevalence of OCD symptoms (76.6-78.9%) and its

significant correlations with symptom prevalence of GAD (46.7%), MDD (41.4%), and moderate/high perceived stress (41.4%). These high levels of stress and symptoms underscore the need for focused mental health prevention, intervention, and follow-up of affected vulnerable groups during the COVID-19 pandemic.

These results align with prevalence rates in a survey-based measurement of 1,257 health care workers in fever clinics and wards for COVID-19 patients in China, which also used the PHQ-9 and GAD-7, in which participants reported high rates of depression (50.4%), anxiety (44.6%), and distress 71.5%.[23] Similarly, in another survey study of the initial stage of the COVID-19 epidemic in China, 1,652 respondents rated the psychological impact as moderate-to-severe, with one-third reporting moderate-to-severe anxiety, and 16.5% reporting moderate-to-severe depressive symptoms.[24]

The results of this early-stage pandemic study support the proposal that surveying the dimension of OCD symptoms is important in communicable disease pandemics. While 25.1-33.1% of the sample endorsed pre-COVID-19 OCD symptoms, an additional 60.3% had new onset worries about germs, dirt, and viruses, and 53.8% had new onset compulsive hand-washing. Post hoc analysis revealed that those with new onset OCD symptoms are statistically more likely to have high stress, likely GAD, and likely MDD. This is a ten to thirtyfold increase in OCD symptoms relative to the prevalence reported in the pre-pandemic general population.[6]

These results indicate that both previous and new onset OCD contamination symptoms correlate with, and may serve as a marker for, a moderate/high stress group that is more vulnerable to GAD and MDD during COVID-19. Because global pandemics are associated with increased somatic and cognitive anxiety,[25,26] the combination of this stress and specific OCD contamination worries may

result in negative-valence cognitive ruminations that activate vulnerabilities to GAD and MDD. The correlation among OCD, GAD, and MDD has been explained by the overlap of common genetics, neurobiology, and shared psychological constructs.[27,28]

The lifetime prevalence of OCD symptoms is over 25%, but only a small proportion fulfill the full criteria for OCD, with a lifetime prevalence of 2.1%.[6] In a four year follow-up of a subgroup of 181 severe acute respiratory syndrome (SARS) survivors that used the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV), common diagnoses included post-traumatic stress disorder (PTSD) (54.5%), depression (39.0%), and OCD (15.6%) – the latter of which is 7 times higher than the lifetime prevalence rate of OCD 2.1%. [29] Thus, whether the new onset OCD symptoms observed in our study are related to true OCD disease risk, or are an expression of specific phobia type risk in the context of COVID-19, or a combination of both, will be for future research to determine. It may also be that the obsessive-compulsive symptoms are an adaptive response to protect self and others from the virus, as the behaviours sampled are in line with public health recommendations. To evaluate the adaptive nature of the symptoms, their persistence or resolution must be determined in the recovery stage of the pandemic, when the acute phase has ended.

In this study, OCD contamination symptoms were associated with male gender, age over 60 years, Caucasian ethnicity, post-secondary education, retired, widowed and living in own home. These findings are contrast with other studies reporting significant association of OCD with younger age, marital status,[30] and female gender specifically with OCD contamination symptoms.[31] The mean age of respondents in our study is 41.95 years (age range 11-88 years), which is higher than the generally reported mean age of onset of 17.9 years for OCD.[32] This is important because onset of OCD prior to 20 years of age is associated with a poor prognosis, whereas onset over 20 tends to

have a shorter course and better outcomes.[33] Therefore, given the later age of onset of OCD symptoms in our study, those who develop OCD symptoms during COVID-19 pandemic are likely to have a better prognosis.

This study suggests that OCD symptoms are associated with the liabilities of increased stress, GAD, and MDD. In balance, in a survey of 705 Hong Kong and 1,201 Singaporean resident population-based survey during the SARS epidemic, general anxiety measured using the State-Trait Anxiety Inventory (STAI) was adaptive and positively associated with the adoption of personal protect measures in Hong Kong.[34] Determining to what degree GAD and OCD symptoms are adaptive versus a liability during the initial phase of the COVID-19 pandemic will require further work. This study, however, adds the association of depressive symptoms in a pandemic to obsessive symptoms, which may indicate a further risk vulnerability for adverse psychological sequelae.

Conclusions

The results of our study reveal a surge in reported symptoms of obsessive-compulsive with corresponding high level of stress, likely GAD, and likely MDD during COVID-19 pandemic. The use of a population-based large sample of Canadians is a significant strength of this study. As our findings correspond to some prevalence rates observed in recent Chinese COVID-19 studies,[23,24] as described above, conclusions drawn from our data regarding the prevalence of OCD symptoms, likely GAD, and likely MDD correlates are likely fairly representative of the overall general Canadian population.

The limitations of the present study include the use of a self-reported questionnaire for cognitive and behavioral symptoms of OCD, GAD, and MDD that would require objective clinical assessment for definitive diagnosis. Secondly, we cannot claim to have sufficient statistical power to clearly

determine the strength of the association between the COVID-19 pandemic and the onset of OCD. Post-pandemic studies are required to determine and understand the temporal relationship between OCD symptoms and the COVID-19 pandemic. Lastly, this survey is unable to measure the direct effect of COVID-19 on persons with a confirmed diagnosis of OCD, and this is an interesting area for future investigation. Our data support the proposal that public health advice during pandemics should incorporate mental health wellness campaigns aiming to reduce the psychological impact of pandemics. There is increasing attention to this need in the media and our data may serve to provide evidence-based support for such policy implementation.

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